
Single Molecule Imaging in Live Embryos Using Lattice Light-Sheet Microscopy.

Journal: Methods Mol Biol

Publication Year: 2018

Authors: Mustafa Mir, Armando Reimer, Michael Stadler, Astou Tangara, Anders S Hansen, Dirk Hockemeyer, Michael B Eisen, Hernan Garcia, Xavier Darzacq

PubMed link: 29956254

Funding Grants: Single Molecule Biophysics and Biology of Cellular Identity

Public Summary:

In the past decade, live-cell single molecule imaging studies have provided unique insights on how DNA-binding molecules such as transcription factors explore the nuclear environment to search for and bind to their targets. However, due to technological limitations, single molecule experiments in living specimens have largely been limited to monolayer cell cultures. Lattice light-sheet microscopy overcomes these limitations and has now enabled single molecule imaging within thicker specimens such as embryos. Here we describe a general procedure to perform single molecule imaging in living *Drosophila melanogaster* embryos using lattice light-sheet microscopy. This protocol allows direct observation of both transcription factor diffusion and binding dynamics. Finally, we illustrate how this *Drosophila* protocol can be extended to other thick samples using single molecule imaging in live mouse embryos as an example.

Scientific Abstract:

In the past decade, live-cell single molecule imaging studies have provided unique insights on how DNA-binding molecules such as transcription factors explore the nuclear environment to search for and bind to their targets. However, due to technological limitations, single molecule experiments in living specimens have largely been limited to monolayer cell cultures. Lattice light-sheet microscopy overcomes these limitations and has now enabled single molecule imaging within thicker specimens such as embryos. Here we describe a general procedure to perform single molecule imaging in living *Drosophila melanogaster* embryos using lattice light-sheet microscopy. This protocol allows direct observation of both transcription factor diffusion and binding dynamics. Finally, we illustrate how this *Drosophila* protocol can be extended to other thick samples using single molecule imaging in live mouse embryos as an example.

Source URL: <https://www.cirm.ca.gov/about-cirm/publications/single-molecule-imaging-live-embryos-using-lattice-light-sheet-microscopy>